REMARKS

The Office action mailed 22 September 2005 rejects claims 1 and 17 under 35 U.S.C. 103(a). United States Patent Application No. 2001/0048306 to Mueller et al. ("Mueller et al.") and a Princeton University publication entitled "Alignment and Matching" by Thomas Funkhouser and Michael Kazhdan ("Funkhouser et al.") have been cited against claims 1 and 17.

Mueller et al. relates to adjustments to the magnetic field applied by a magnetic resonance imaging (MRI) magnet in an MRI system. Mueller et al. describes a system for adjusting gradient-coil and shimming currents so that a magnetic resonance image appears to stay undistorted.

Funkhouser et al. teaches techniques for using Fourier transforms for translations. Funkhouser et al. also teaches techniques for using spherical harmonic transforms for rotations.

The Examiner is respectfully requested to withdraw the obviousness rejection of claims 1 and 17, in light of the following comments. This is because the cited references fail to disclose or suggest various features of claims 1 and 17, including at least those features discussed below.

The Office action states that Mueller et al. teaches, at paragraph [0035], a method comprising "monitoring a magnetic field of sources in the object at a plurality of magnetic detectors to obtain a corresponding plurality of sensor outputs". This is incorrect. Mueller et al. fails to disclose or suggest a method which includes this step.

Mueller et al. relates to MRI systems. An MRI system typically comprises only a single sensor for measuring the intensity, frequency and/or phase of an oscillating magnetic field in a object. The oscillating magnetic field is caused by precession of atomic nuclei induced by applied magnetic fields. Additional sensors in an MRI system may be used for controlling the applied magnetic fields, but not for "monitoring a magnetic field of sources in the object", as recited in claim 1.

Paragraph [0035] of Mueller et al. refers to the gradient and shim coils and to the high-frequency antenna(s) in an MRI system. The shims and gradient coils in the MRI system of Mueller et al. are not used as sensors, and do not provide a plurality of sensors.

The high-frequency antennas in the MRI system of Mueller et al. are used to radiate energy to stimulate magnetic resonance in a subject. The high-frequency antennas are also not sensors. Thus, Mueller et al. fails to disclose or suggest a method including the step of "monitoring a magnetic field of sources in the object at a plurality of magnetic detectors to obtain a corresponding plurality of sensor outputs", as recited in claim 1.

The Office action states that Mueller et al. teaches, at paragraph [0038], a method comprising "modeling the magnetic field of the sources in the object as a gradient of a scalar potential". This is incorrect. Paragraph [0038] of Mueller at al. does not refer to scalar potentials or magnetic fields or modeling the magnetic field of sources in an object. Mueller et al. fails to include any discussion of modeling of magnetic fields. Thus, Mueller et al. fails to teach or suggest a method including the step of "modeling the magnetic field of the sources in the object as a gradient of a scalar potential", as recited in claim 1.

The Office action states that Funkhouser et al. teaches, at pages 9 and 17, "a spherical translation transformation technique". However, a careful reading of Funkhouser et al. reveals that Funkhouser et al. fails to teach or suggest such a technique.

As stated above, Funkhouser teaches the use of ***Fourier transforms*** for translations (see pages 9-16 of Funkhouser et al.). Funkhouser et al. fails to teach or suggest the use of spherical harmonic transforms for translations. The only use of spherical harmonic transforms taught by Funkhouser et al. is for rotations (see pages 9 and 17-18 of Funkhouser et al.).

Spherical-harmonics are referenced only in the first and last sentences of Paragraph [0007] of Mueller et al., and there only to note that 12 degrees of freedom can cancel the most severe inhomogeneities in the applied magnetic field. (This may be included to emphasize that there are only 12 degrees of freedom in the first and second gradients of the vector magnetic field.) There is no reference in Mueller et al. to the use of spherical harmonic transforms for translations.

Thus, the cited references fail to teach or suggest a method for magnetic imaging of an object which includes the step of "compensating for changes in the position of the object by applying a transformation to the plurality of sensor outputs, the transformation including, at least in part, a spherical harmonic translation transformation", as recited in claim 1.

Accordingly, it is submitted that claim 1, and all of claims 2-24 which depend therefrom, are patentable over the cited references.

Reconsideration and allowance of this application is respectfully requested in light of the comments set out above.

Respectfully submitted,
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